

REMARKS

Claims 1-20 are pending in this application. By this Amendment, claim 1 is amended to further recite the claimed method.

No new matter is added by this Amendment. Support for the language added to claim 1 can be found throughout the specification, for example at paragraphs 16 and 21.

Entry of the amendments is proper under 37 CFR §1.116 since the amendments: (a) place the application in condition for allowance (for the reasons discussed herein); (b) do not raise any new issue requiring further search and/or consideration (as the amendments amplify issues previously discussed throughout prosecution); (c) do not present any additional claims without canceling a corresponding number of finally rejected claims; and (d) place the application in better form for appeal, should an appeal be necessary. The amendments are necessary and were not earlier presented because they are made in response to arguments and inquiries raised in the final rejection. Entry of the amendments is thus respectfully requested.

I. Specification Objection

The specification was objected to for allegedly lacking an enabling description to "mix throughout" and/or to form a "minutely polycrystal or amorphous" metallic oxide film by being "epitaxially grown." Applicants respectfully disagree with the Patent Office's assertion.

Applicants submit that the specification enables the claimed method. In particular, Applicants submit that the example method disclosed in paragraphs 30 and 31 adequately describes a method for fabricating a metallic oxide film of high dielectric constant as recited in claims 1-20. Moreover, paragraphs 17-29 of the specification further disclose the subject matter claimed herein.

As such, Applicants submit that the specification includes an enabling description. Reconsideration and withdrawal of the specification are thus respectfully requested.

II. Rejection Under 35 U.S.C. §112, first paragraph

Claims 1-20 were rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement. This rejection is respectfully traversed.

Applicants submit that claims 1-20 are enabled by the disclosure. The specification clearly explains how to make the claimed invention as required. See MPEP §2164.01(b). As such, one of ordinary skill in the art would be able to make and use the metallic oxide film recited in claims 1-20.

In the Office Action, the Patent Office has set forth a number of inquiries requesting explanation of various matters. Specifically, the Patent Office alleges that the Applicants have stated that the results are different than a previously cited reference, Osten, H.J. et al., "High-K Dielectrics with Ultra-Low Leakage Current Based on Praseodymium Oxide, "IEEE (2000), pp. 28.5.1-28.5.4 ("Osten"), without providing details in the specification to arrive at the claimed results. Applicants respectfully disagree, and respond to the Patent Office's inquiries below.

In responding to the Patent Office's inquiries, it is noted that the inquiries are directed to seeking an understanding of the differences between Osten and the present claims. This is not an enablement inquiry. The claims are clearly enabled by the specification as discussed above, the specification setting forth how to practice the present claims. Applicants nevertheless respond to the Patent Office's inquiries, in an effort to advance the application to allowance.

Osten clearly teaches that mixing is carried out to some degree near the interface between the Si substrate and the Pr_2O_3 film. Mixing does not occur throughout the Pr_2O_3 film because no significant hysteresis is observed. See column 3 of Osten. Further, the thermal treatment taught by Osten is carried out at 600°C. See the Introduction and Experimental sections of Osten.

Applicants submit that since the treatment in Osten is carried out at a lower temperature, the constituent elements of the substrate cannot diffuse throughout the Pr_2O_3 film, so that the constituent elements being mixed can occur only at the interface between the substrate and the Pr_2O_3 film.

In contrast, claim 1 requires that the thermal treatment take place in a temperature range from 900°C to 1000°C . Since the thermal treatment is carried out at such a temperature (which is higher than Osten), the constituent elements of the substrate can diffuse throughout the Pr_2O_3 film. See paragraph 22 of the specification. Thus, the mixing of the constituent elements can occur throughout the metallic oxide film. In other words, the difference in the mixing of the constituent elements in the present application and the mixing of the constituent elements in Osten may originate, at least in part, from the difference in thermal treatment temperatures.

Furthermore, the thermal treatment in the present application may be carried out at a rate of $50\text{-}100^\circ\text{C}/\text{sec}$. See paragraph 26 of the specification. In contrast, Osten does not teach or suggest any specific heating rate. The difference in the mixing of the constituent elements in the present application and Osten may occur because of this heating rate.

Applicants submit that the difference in the mixing of the constituent elements as disclosed in the present application and as taught by Osten may be the result of these differences in the thermal treatment temperature and/or the heating rate. Applicants further submit that the specific crystalline structure of the metallic oxide film may be caused by the higher heating rate in the thermal treatment disclosed in the present application.

In response to the Patent Office's inquiry regarding the reason the film taught by Osten is not amorphous and shows no mixing, Applicants submit that although the Pr_2O_3 film and the substrate are annealed at 1000°C for fifteen seconds for a thermal resistance test according to Osten, the constituent elements of the substrate cannot diffuse throughout the Pr_2O_3 film

because the Pr_2O_3 film has been crystallized during the thermal treatment of 600°C for fifteen minutes.

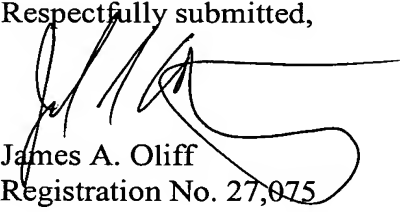
For the foregoing reasons, Applicants submit that claims 1-20 are enabled. Specifically, the specification provides more than adequate details for one of ordinary skill in the art to make and use the subject matter claimed herein. Reconsideration and withdrawal of the rejection are thus respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-20 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,


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